DOCUMENT RESUME

ED 447 492 CS 217 288

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TITLE	Language Arts in the Science Curriculum.
PUB DATE	2000-00-00
NOTE	9p.
PUB TYPE	Opinion Papers (120)
EDRS PRICE	MF01/PC01 Plus Postage.
DESCRIPTORS	*Content Area Reading; *Content Area Writing; Elementary Education; *Language Arts; Learning Strategies; Models; Photographs; *Science Curriculum; Science Education; Word Recognition
IDENTIFIERS	Communication Context; Posters

ABSTRACT

Language arts experiences integrate well with quality science lessons and units of study. For example, there are many opportunities for listening, speaking, reading, and writing activities in science. Ideas gleaned in science need to be communicated in diverse ways involving one or more senders and receivers of messages. Students may read about performing a science experiment from a reference source. They might also read background information prior to experimentation so that the learning opportunity is more meaningful and interesting. The various word recognition skills are essential for students to acquire as tools to reading. There are a variety of science reading sources which include the following: encyclopedia sections, library books, CD-ROM materials, content in software, textbooks, and information from sources used to obtain subject matter for an oral or written report. Science experiments need to be written up with a format to include the problem, information gathered, statement of a testable hypothesis, and evaluation of the hypothesis based on relevant data. The making of models can be a hands-on activity in learning science content. Writing about the model can include a plan for developing the model, how the model differs from the real object, as well as related graphs, charts, and tables. Students can also become involved in developing posters to indicate achievement. Ideas from a conservation poster can be used for a photo essay. And both of these activities can lead to writing experiences in the science curriculum. (NKA)

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Language Arts in the Science Curriculum.

by Marlow Ediger

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LANGUAGE ARTS IN THE SCIENCE CURRICULUM

Language arts experiences integrate well with quality science lessons and units of study. Thus, for example, there are many opportunities for listening, speaking, reading , and writing activities in science. Each student needs to achieve optimally in these learning activities in science. Language arts experiences may be thought of as necessary to communicate vital ideas in science. Ideas gleaned in science need to be communicated in diverse ways involving one or more senders and receivers of messages.

Reading in Science as Communication

With written script, there are senders of messages from the author to the reader. Thus, for example, reading harmonizes well with a hands on approach in science learning.Students may read about performing a science experiment from a reference source. Learners individually or in a committee may then read about and then actively engage in doing the experiment. Students might also read background information prior to experimentation so that the learning opportunity is more meaningful and interesting. Reading science content involves may skills and students need to master those which assist in comprehending subject matter more thoroughly. the science teacher may assess the student to ascertain which skills are possessed and which need developing by the individual leaner.

Word recognition skills need to be developed as tools to reading which lead to comprehension and use of ideas read. The following word recognition skills are essential for students to acquire:

1. phonics to associate graphemes (symbols) with phonemes (sounds). Thus, if a student does not recognize a word when reading science content, he/she independently may sound out the individual letters by relating the grapheme with the related phoneme.
2. syllabication skills. A student who does not identify a word may divide it into syllables and determine what the unknown words is. Students need to become independent in word recognition skills so that more fluency in reading science content is in the offing.
3. context skills. Here, the student uses surrounding words to identify the unknown. Meaning theory is involved in using context clues to identify an unknown word. The chosen word then needs to make sense in relationship to the surrounding words.
4. picture clues. a young reader, in particular, may not be able to identify an unknown word, but can when viewing a picture on the same page. The picture then refers directly to the unknown word in reading science content (Ediger, 2000, Chapter Seven).

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Beyond word recognition skills, the student needs to also comprehend subject matter read. Comprehension may be thought of as occurring at different levels, such as

1. recalling ideas read. This is the first and lowest level of comprehension. It is important, however, since the recall of information read is needed in order to move to higher levels of cognition.
2. understanding of subject mater read in science. To understand means to say in one's own words that which has been read.
3. application of what has been read. Here the student uses information read to solve a problem in science or to give a report to classmates.
4. thinking critically. The student after having read subject matter in science separates facts from opinions, fantasy from reality, as well as accurate from inaccurate ideas. Also, the student separates usable from non usable ideas to solve problems.
5. thinking creatively. Creative thought emphasizes students coming up with unique and new ideas. Novelty in thinking is a key concept there.
6. evaluation of ideas. The student needs to appraise the worth of each idea as it contributes to what is being stressed in the ongoing lessons or unit of study. Thus, content gleaned needs to be valuable to what is being pursued. Irrelevant subject matter is to be eliminated to make room for the salient and the useful (See Bloom, 1956).

Reading in science is a complex learning. There are a plethora of facets involved, including word recognition skills as well as diverse kinds of comprehension. There are a variety of science reading sources which include the following:

1. encyclopedia selections.
2. library books.
3. CD ROM materials.
4. content in soft ware such as tutorial, drill and practice, simulation, and games.
4. textbooks and supplementary books.
5. printed script accompanying films, filmstrips, and slides.
6. pursuing information from a variety of sources to obtain subject matter for an oral or written report (Ediger, 2000,155-161).

To benefit more optimally from reading, the student first needs to possess adequate subject matter background, see and discuss now words in print, have several purposes or reasons for reading, and experience followup activities after reading has been completed.

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Writing and Hands on Approaches in Learning

Writing is a complementary activity of reading. Thus what has been read may be written down or what has been written may be read. Students need ample experiences pertaining to both reading and writing. in the science curriculum. A hands on approach in learning is vital in science. Experimentation then becomes a vital objective for learners in ongoing lessons and units of study. Science experiments need to be written up with a format to include the problem, information gathered from a variety of reference sources in answer to the problem, statement of a testable hypothesis, evaluation of the hypothesis based on relevant data, as well as revision of the hypothesis if needed. When judging public school science fairs, the author read over carefully if the participant had written out the above named steps for his/her project. After which, the participant in the science fair would explain his/her project.

The making of models can be a very useful activity in a hands on approach in learning science content. In writing up subject matter pertaining to the model, the student needs to be accurate and include what is salient. Thus, the student needs to indicate clearly how the model will demonstrate in a meaningful way science concepts to be explained. If the student then has developed a model solar heating unit, the inherent concepts need to be explained. A plan for developing the model needs to be drawn with each part therein labeled correctly. The writing needs to state how the model differs from the real object as well as how the model simulates the real item. Related graphs, charts, and tables are clearly and neatly labeled. Safety instructions, if necessary, are included on how to handle the model. Hands on approaches in learning and written work are highly complementary to each other (Ediger, 2000, 58-67).

Booklets developed by students might also stress vital facts,concepts, and generalizations acquired in ongoing lessons and units of study. The booklet should have a consistent theme throughout its contents. When making divisions within the booklet, a theme centered procedure needs to emphasize main ideas, with each containing related subordinate ideas. Ideas presented therein are original and creatively presented. Proper credit is given for the sources used to obtain information. Written work here is accurate and neat with appropriate sentence structure, syntax, semantics, and grammar. The written work effectively communicates ideas to the receiver of information. The writer communicates meaning and understanding of subject matter. Readers and listeners to the content read aloud find the information useful, interesting and informative. The author supervised student teachers for thirty years in the public schools and noticed a sixth grader who had developed in interesting booklet for a science unit on vertebrates. He

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had developed an accurate illustration for each of the vertebrates. Thus, for example, a picture on reptiles showed a snapping turtle. The drawing was based on an actual snapping turtle seen in a farm pond, near his home. Underneath the illustration, there was well arranged and organized subject matter on these kinds of turtles including where they were found, food eaten, enemies of this animal, hibernation habits, and life span. It was easy to read the related content since the sentences were sequential and each word spelled correctly. Parts of the turtle were ladled on the drawing. A very neat project was in evidence with the booklet on vertebrates (Ediger, 2000, 33-34).

A concise newspaper article was sent to the county weekly newspaper and punished. The student was very proud of his accomplishments which seemingly spurred him on to greater accomplishments and achievements. The local school has sent in numerous article of student achievement to this newspaper. A small, rural weekly newspaper generally publishes contributions of school news. The student's article was carefully written in terms of correct grammar, spelling, sentence structure, syntax, and semantics. Accuracy of ideas focused on a main idea with supporting details. Sequential ideas were inherent (Ediger, 2000, 75-79)..

Making Posters

Students can become highly involved in developing posters to indicate achievement. A poster made for a contest can stimulate student accomplishment. A contest sponsored by the local Save the Environment Week provided impetus for students entering a poster on environmental quality. One poster developed by a student caught the special attention of the author while visiting student and cooperating teachers. The poster was entitled "Conserving Soil In Our Environment. The student with teacher assistance offered the following within a poster:

1. an accurately drawn farm field containing terraces, seeded grass to prevent soil erosion, strip cropping to rotate the kinds of crops grown on a field, trees and grass growing around a neighboring creek, a sheltered wild-life habitat, and a grassed waterway.
2. accurate, neat labeling of each soil conservation program, with a concise, accurate description of each approach, directly underneath its drawing. The theme of the poster seemingly matched well with the illustrations and descriptions of the project. It was eye catching in its total appeal and creative presentation (Ediger, 2000, 19-21).

The ideas from the conservation poster were readily used for a photo essay. Each concept of soil conservation illustrated in the poster was drawn separately, with the appropriate label underneath as to the approach used to conserve, such as using terraces. A detailed summary of terraces was written in terms of purpose and reasons for their being.

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Next in sequence, the grass covering on a farm field was drawn, labeled, and described with accurate information. Correct labeling of words and unity within a paragraph was stressed. Each drawing pertaining to soil conservation was arranged sequentially and neatly. Each student described his/her photo essay to classmates pointing out difficulties encountered in doing the project. Classmates asked questions of the preparer of the photo essay, such as the following:

1. what value is strip cropping in the total soil conservation program?
2. why should trees and grass be located near to a stream of water, such as a creek?
3. how could animals in the environment assist in conserving the soil?

Poster development and photo essays, as is true of numerous activities, can lead to other writing experiences. Pertaining to soil conservation and/or animal life in the environment, students may perceive the writing of related fiction or non-fiction. The science teacher may raise questions of learners which may assist in students desiring to do more writing. It is easy to see how expository writing (Non-fiction) would harmonize well with content on soil erosion. Thus, additional information may be located on prevention of erosion. There is a vast amount of information available on planting trees to help prevent soil erosion. Also, the previous methods discussed can provide for increased depth learning by students. Thus, there is always new information to learn which needs harmonizing with the old. When being a member of the Future Farmers of America (FFA) organization during my senior year in high school, the author developed handbook on soil conservation practices. Having lived on the farm all of his life and surrounded by many kinds of trees on the farmstead, he, through extensive research, developed and wrote an extensive handbook on trees used in preventing sol erosion. Depth learning here was based on first hand experiences such as when growing up on a farm. Oak, poplar, walnut, maple, cherry, apple, peach, and hedge trees were studied. In the handbook on trees to prevent soil erosion, the author divided the title into the following short chapters:

1. how trees prevent soil erosion.
2. which trees to plant and how to take care of them.
3. watching for and taking care of tree diseases.
4. how to take care of young trees from being harmed by selected kinds of animal life.
5. trimming the trees properly to promote quality growth.
6. caring for trees in times of drouth, excessive rain, and ice storms.
7. using nutrients to assist in proper tree growth.

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8. grafting of limbs onto the host trees.
9. thinning tree numbers if there are too many in any one area.
10. preventing soil erosion and the tree population (Ediger, 1999, 37-46).

The above described handbook had to meet the following class requirements by stressing :

1. accurate, neatly drawn illustrations of each tree, properly labeled.
2. ample, needed content on each chapter. The content had to be meaningful and make sense. Depth study, not survey methods, were to be emphasized.
3. subject matter presented sequentially with unity stressed in each paragraph. Main ideas were to be supported by adequate details.
4. words being spelled correctly within grammatically correct sentences..
5. written criteria to be used in appraising the handbook.

Project methods of instruction, such as developing a handbook to prevent soil erosion, require

1. goal setting. These goals need to be clear and achievable.
2. student purpose. Otherwise energy levels for project completion may low.
3. interest in the subject matter being pursued with adequate background information in the offing.
4. planning, perseverance, and effort.
5. assessment in terms of definite criteria, necessary to notice achievement and progress (Ediger, 2000, 10-12).

In Conclusion

There are numerous other language arts activities which may be included in the science curriculum. These include

1. writing outlines to notice main and subordinate ideas.
2. writing summaries in order to pinpoint generalizations versus subordinate ideas.
3. writing biographies in order to learn more about famous scientists, such as Louis Pasteur, Joseph Lister, Gregory Mendel, Galileo, William Harvey, Pierre and Madam Curie, and Sir Isaac Newton.
4. writing items for a survey to be conducted. Clarity of each item in the survey is important. Using charts, graphs, and tables in writing up the results is important.
5. writing laboratory reports including an introduction, statement of the problem, the design of the experiment, collection of data, summary, and further studies which need to be made.

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6. writing captions and summary information for a bulletin board display.

7. writing information for both sides of an issue in the world of s science.

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